## AMENDMENTS TO THE CLAIMS

Please amend the claims, without prejudice, as follows where underlining identifies added material and strikethroughs identify deleted material:

1. (Currently Amended) A capacitive sensing system comprising:

a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) ~~port~~ pin capable of functioning in both an INPUT mode and an OUTPUT mode;

a conductive sense element in electrical communication with the I/O pin ~~port~~, and

a resistance element in electrical communication with the conductive sense element to form an electrical pathway from the conductive sense element to an electrical discharge point;

wherein the microcontroller is further operable to:

at a first time, charge the sense element by causing a selected voltage to be placed on the I/O pin by setting the I/O pin to the OUTPUT mode in the high state ~~port~~;

at a second time, cease placing the selected voltage on the I/O pin ~~port~~;

thereafter, set the I/O pint to the INPUT mode, which causes the conductive sense element to discharge through the resistance element, and measure voltage at the I/O pin ~~port~~, the voltage at the I/O pin ~~port~~ being representative of voltage at the sense element; and

measure a parametric value required for voltage at the conductive sense element to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by at least the conductive sense element and a first object that may be in contact or proximity with the conductive sense element, whereby the parametric value is representative of contact or proximity between the sense element and the first object.

2. (Original) The system of claim 1 wherein the parametric value is time.

3. (Original) The system of claim 2 wherein time is measured using a clock element inherent to the microcontroller.

4. (Original) The system of claim 1 wherein the parametric value is a number of discharge pulses.

5. (Currently Amended) The system of claim 1 wherein the microcontroller is further operable to perform digital signal processing on signals derived from the conductive sense element.

6. (Original) The system of claim 5 wherein the signal processing includes resolution enhancement.

7. (Original) The system of claim 5 wherein the signal processing includes automatic calibration.

8. (Original) The system of claim 5 wherein the signal processing includes continuous calibration.

9. (Original) The system of claim 5 wherein the signal processing includes noise reduction.

10. (Currently Amended) The system of claim 5 wherein the signal processing includes pattern recognition wherein the microcontroller is operative to implement one or more of a plurality of software applications to perform digital signal processing on signals derived from the conductive sense element to detect one or more selected patterns of contact or proximity between the first object and the conductive sense element.

11. (Currently Amended) The system of claim 10 wherein the signal processing comprises the synthesis of at least one virtual sensor capable of detecting one or more of the selected patterns of contact or proximity between the first object and the conductive sense element.

12. (Currently Amended) The system of claim 10 wherein the signal processing comprises the synthesis of multiple virtual sensors from ~~a single~~ the conductive sense element, each virtual sensor being capable of detecting one of the selected patterns of contact or proximity between the first object and the conductive sense element.

13. The system of claim 11 or 12 adapted for embedding in a second object.

14. The system of claim 13 wherein the second object is a toy.

15. (Canceled)

16. (Currently Amended) The system of claim 1, 11 or 12 wherein the microcontroller is further operable to receive separate signals from a plurality of conductive sense elements, each in electrical communication with the I/O pin ~~port~~.

17. (Canceled)

18. (Original) The system of claim 6 wherein the signal processing comprises resolution enhancement by:

taking multiple timing-based measurements of the parametric value, using different, selected timing offsets; and

then averaging across the multiple timing-based measurements.

19. (Original) The system of claim 18 wherein the resolution enhancement further comprises:

running a timing loop iteratively with different, selected timing delays; and

then deriving an average value from the multiple timing-based measurements thereby obtained.

20. (Original) The system of claim 1 wherein the sense element is any of a conductive plate, strip, fabric, textile, thread, coating, or ink.

21. (Currently Amended) A method of capacitive sensing, the method comprising:

providing a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) ~~port~~ pin capable of functioning in both an INPUT and OUTPUT mode;

providing a conductive sense element in electrical communication with the I/O pin ~~port~~, and

providing a resistance element in electrical communication with the conductive sense element to form an electrical pathway from the conductive sense element to an electrical discharge point;

and configuring the microcontroller to:

at a first time, charge the sense element by causing a selected voltage to be placed on the ~~port~~ I/O pin by setting the I/O pin to the OUTPUT mode in the high state;

at a second time, cease placing the selected voltage on the port;

thereafter, set the I/O pin to the INPUT mode, which causes the conductive sense element to discharge through the resistance element, and measure voltage at the I/O pin ~~port~~, the voltage at the port being representative of voltage at the sense element; and

measure a parametric value required for voltage at the conductive sense element to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by at least the conductive sense element and a first object that may be in contact or proximity with the conductive sense element, whereby the parametric value is representative of contact or proximity between the sense element and the first object.

22. (Original) The method of claim 21 wherein the parametric value is time.

23. (Original) The method of claim 22 wherein time is measured using a clock element inherent to the microcontroller.

24. (Original) The method of claim 21 wherein the parametric value is a number of discharge pulses.

25. (Currently Amended) The method of claim 21 further comprising: configuring the microcontroller is to perform digital signal processing on signals derived from the conductive sense element.

26. (Original) The method of claim 25 wherein the signal processing includes resolution enhancement.

27. (Original) The method of claim 25 wherein the signal processing includes automatic calibration.

28. (Original) The method of claim 25 wherein the signal processing includes continuous calibration.

29. (Original) The method of claim 25 wherein the signal processing includes noise reduction.

30. (Currently Amended) The method of claim 25 wherein the signal processing includes pattern recognition wherein the microcontroller is operative to implement one or more of a plurality of software applications to perform digital signal processing on signals derived from the conductive sense element to detect one or more selected patterns of contact or proximity between the first object and the conductive sense element.

31. (Currently Amended) The method of claim 30 wherein the signal processing comprises: synthesizing at least one virtual sensor capable of detecting one or more of the selected patterns of contact or proximity between the first object and the conductive sense element.

32. (Currently Amended) The method of claim 30 wherein the signal processing comprises: synthesizing multiple virtual sensors from ~~a single~~ the conductive sense element, each virtual sensor being capable of detecting one of the selected patterns of contact or proximity between the first object and the conductive sense element.

33. (Original) The method of claim 31 or 32 adapted for embedding in a second object.

34. (Original) The method of claim 33 wherein the second object is a toy.

35. (Canceled)

36. (Currently Amended) The method of claim 21, 31 or 32 further comprising: configuring the microcontroller to receive separate signals from a plurality of conductive sense elements, each in electrical communication with the I/O pin ~~port~~.

37. (Canceled)

38. (Original) The method of claim 26 wherein the signal processing further comprises resolution enhancement by:

taking multiple timing-based measurements of the parametric value, using different, selected timing offsets; and

then averaging across the multiple timing-based measurements.

39. (Original) The method of claim 38 wherein the resolution enhancement further comprises:

running a timing loop iteratively with different, selected timing delays; and then deriving an average value from the multiple timing-based measurements thereby obtained.

40. (Currently Amended) A capacitive sensing system capable of sensing the presence of a non-conductive object interspersed between a conductive sense element and electrical ground, the system comprising:

a microcontroller, capable of being connected with an electrical power source and having at least one digital logic input/output (I/O) ~~port~~ pin capable of functioning in both an INPUT mode and an OUTPUT mode;

a conductive sense element in electrical communication with the I/O pin ~~port~~, and

a resistance element in electrical communication with the conductive sense element to form an electrical pathway from the conductive sense element to an electrical discharge point;

wherein the microcontroller is operable to:

at a first time, charge the sense element by causing a selected voltage to be placed on the I/O pin by setting the I/O pin to the OUTPUT mode in a high state ~~port~~;

at a second time, cease placing the selected voltage on the I/O pin ~~port~~;

thereafter, set the I/O pin to the INPUT mode, which causes the conductive sense element to discharge through the resistance element, and measure voltage at the I/O pin ~~port~~, the voltage at the I/O pin ~~port~~ being representative of voltage at the sense element; and

measure a parametric value required for voltage at the conductive sense element to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by at least the conductive sense element and the non-conductive object, whereby the parametric value is representative of contact or proximity between the conductive sense element and the non-conductive object.

41. (Currently Amended) A capacitive sensing system comprising:

a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) pin capable of functioning in both an INPUT mode and an OUTPUT mode ~~port~~; and

a conductive sense element in electrical communication with the I/O pin ~~port~~; wherein the microcontroller is further operable to:

at a first time, discharge the sense element by setting the I/O pin to the INPUT mode;

at a second time, set the I/O pin to the OUTPUT mode in the high state to begin charging the sense element by placing a selected voltage on the I/O pin ~~port~~;

thereafter, measure voltage at the conductive sense element; and

measure a parametric value required for voltage at the conductive sense element to increase to a value above a threshold value, the parametric value being representative of an effective capacitance formed by at least the conductive sense element and a first object that may be in contact or proximity with the conductive sense element, whereby the parametric value is representative of contact or proximity between the conductive sense element and the first object.

42. (Currently Amended) A non-contact object identification system, comprising:

a microcontroller, operable to receive electrical power from an electrical power source, and having at least one digital logic input/output (I/O) pin capable of functioning in both an INPUT mode and an OUTPUT mode ~~port~~;

at least two conductive sense elements in electrical communication with the I/O pin ~~port~~, the at least two conductive sense elements forming a binary-coded identification pattern and

a resistance element in electrical communication with each conductive sense element to form an electrical pathway from each conductive sense element to an electrical discharge point;

wherein the microcontroller is further operable to:

at a first time, charge the conductive sense elements by causing a selected voltage to be placed on the I/O pin by setting the I/O pin to the OUTPUT mode in the high state ~~port~~;

at a second time, cease placing the selected voltage on the I/O pin ~~port~~;

thereafter, set the I/O pin to the INPUT mode, which causes the conductive sense elements to discharge though the associated resistance element, and measure voltage at the I/O pin ~~port~~, the voltage at the I/O pin ~~port~~ being representative of voltage at the conductive sense elements; and

measure a parametric value required for voltage at the conductive sense elements to decline to a value below a threshold value, the parametric value being representative of an effective capacitance formed by ~~at least~~ the conductive sense elements and ~~a first~~ an object ~~that may be~~ in ~~contact or~~ proximity with the conductive sense elements, whereby the parametric value is representative of ~~contact or~~ proximity between the conductive sense elements and ~~the first~~ such object; wherein:

when an object having a corresponding binary-coded identification pattern is aligned with the binary-coded identification pattern formed by the conductive sense elements, the alignment is detected by the conductive sense elements and the microcontroller signals identification of the binary-coded object.